

ABSTRACT

Methods are presented for calculating the wavelet filters and their inverses which rely on a new method of sampling (UA, TA, A) either digital or analog data. These methods combine and extend to give novel procedures for non-reversible multi-dimensional data compression. For selected applications, this procedure improves achievable compression factors by an estimated one to three orders of magnitude and is well-suited to picture build-up or other iterative refinement. Combining these wavelet filters and their inverse with previous theoretical work furthermore provides novel methods for calculating Fourier and other transforms. In a preferred embodiment used to calculate the Fourier transform (1) and its inverse (34) applied to digital input data, the method replaces the fast Fourier transform and its inverse and provides improvements in achievable accuracy. The new sampling method is inherently multiscale, and the invention thereby obviates the usual Nyquist constraint on the meaningful bandwidth in terms of the number of samples. Finally, the invention provides novel and efficient analog-to-digital and digital-to-analog interface.